The

Monthly Evening Sky Map

A JOURNAL FOR THE AMATEUR — FOUNDED BY THE LATE LEON BARRITT
—NORTHERN AND SOUTHERN HEMISPHERE—

ALSO A STAR, CONSTELLATION AND PLANET FINDER MAP ARRANGED FOR THE CURRENT MONTHS — APR.-MAY-JUNE MORNING AND EVENING — AND PRACTICAL ANYWHERE IN THE WORLD

PUBLISHED QUARTERLY

Largest Circulation of any Amateur Astronomical Journal in the World

Entered as second class matter, at Shohola, Pennsylvania, under the act of March 5, 1879

Vol. XLVII Whole No. 476 SHOHOLA, PA. APRIL-MAY-JUNE, 1953 $2.00 PER YEAR 60 Cts. Per Copy

UNIV. OF MINNESOTA APR 2 '53

EVENING SKY MAP FOR APRIL

Face South And Hold The Map Overhead. The Top North And You Will See The Stars And Planets Just As They Appear In The Heavens. The Arrow Through The Two Stars In The Bowl Of The Big Dipper Points To The North Star. The Star At The End Of The Little Dipper.

AT 9:00 P. M., APRIL 1; 8:00 P. M., APRIL 15; 7:00 P. M., APRIL 30

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

XUM

"The Coming Conquest of Space"

"The Coming Conquest of Space" was written in 1946 by Harry Akers, Jr., at the age of 12½, as a social science assignment in Balboa Junior High School, Balboa Heights, Canal Zone. It was first published in the Monthly Evening Sky Map in 1946-1948. In 1952, the author, now a student at Colorado School of Mines, Golden, Colorado, at the request of the editors of the MONTHLY EVENING SKY MAP, revised and enlarged the article by means of foot notes. The original text appears in normal type, the recently-added foot notes in italic type.

(*Continued from last issue*)

CHAPTER VII TRIPS TO PLANETS OF OTHER STAR

We have explored the heavenly bodies closest to us, and even these have taken us very far from home. We still have seen but a small part of the universe, and have explored the domains of only one small, insignificant star. The nearest star (exclusive of our Sun) is thousands of times as far away as the Sun; and this is only the *nearest* star. Its name is Alpha Centauri, and it is 4 1/3 light years away. Light travels at the rate of 186,300 miles per second. A light year, 5.88 million million miles, is the distance covered by light in a year. The new 200-inch telescope will be able to see stars a billion light years away—stars whose light left them a billion years ago, and will just be arriving when they are seen through the telescope. Some of these stars may have planets revolving around them. Expeditions to these stars would answer the question of whether these planets exist, and what they are like. Expeditions to the stars would be the most profitable, yet the least apt to come into reality, of our space-voyages.

The nearest bright star, Alpha Centauri, is a binary—two stars revolving around their common center of gravity. A smaller star revolves around a larger one in about eighty years. If Alpha Centauri has planets, they must lie between the two stars, for if they lay outside the system they would not be able to revolve around suns moving relative to each other—their motion would be too irregular. If they are to have life on them, they will have to revolve around either one of the stars, for the two stars are about as far apart as Uranus and the Sun. They would be too cold otherwise.

Although actual trips to the stars are not likely to come, imaginary ones can be made even today. Of course we could not land on any *star* any more than we could land on the Sun, for the stars are suns, and most of them are hotter than ours. Long before we arrived at the star to which we were going, we could tell if it had any planets, and pick out the one to land on first. There might be some planets similar to our Earth—planets with atmospheres full of life-giving oxygen and other gases necessary for life; planets partially covered by oceans, and with temperatures similar to those on the Earth. They may even have life ! ! We could go on exploring new planet after new planet, but we must return to the Earth. What news we will have when (and *if*) we get back ! ! Yet we have still explored just a tiny part of the universe. Years later, we must go back into interstellar spaces, to explore still other solor systems. We will see that planets belonging to the binary 61 Cygni, which weighs 16 times as much as our Jupiter—how powerful the gravity must be at its surface ! ! And so we could go on exploring, photographing, and writing accounts, going farther and farther into the vast spaces between stars, "until the end of eternity", and even then we would have seen but a small part of the universe.

However, although in the *very* far-distant future, we *may* be able to reach a *near* star's planets, it is very improbable that we will ever be able to reach—or have any good reason for trying to reach—the distant stars.

What about speeds and time required for trips to stars ? Modern physicists tell us that the speed of light represents the limiting speed which a material body can reach. Stellar distances are measured in light years, and distances to stars are often many thousands of light years. Even if a rocket *could* be made powerful enough to *approach* the speed of light, many long, tedious years would be required for a journey to a star. Since propulsion at a speed approaching that of light is far beyond our present knowledge, such a trip is out of the question even in the relatively distant future.

Scientists in the United States are already working on rocket projects—not with atomic energy, however, for not enough is known about controlling it at present—with the idea in mind of creating a rocket powerful enough to be fired off into outer space, directed by radar impulses from the Earth. Scientists are now really thinking seriously of sending radar-controlled rockets around the Moon—even to the Lunar surface itself.

The time may not be far off when radar-controlled rockets will be preceding expeditions to the Moon, Mars and the other planets. Who can tell what may happen ?

Great strides have been made in atomic energy research since 1946, including work (in the blueprint or construction stages) on atomic-powered engines of various kinds for terrestrial use. *Chemical* rockets, using the "step-rocket" principle, have exceeded the speed of one mile per second, and have reached altitudes of well over 200 miles. Many suggestions have also been made concerning a possible man-made "satellite" to circle the Earth as the Moon does, but, being much closer than the Moon, in a much shorter time. A satellite about 22,000 miles from the Earth's surface would circle the Earth once a day, and could be kept directly "above" some desired point at all times. Such a satellite would be very valuable as a stopover and refueling station for space voyages, because little fuel would be required to reach the velocity of escape from the Earth *at the distance of this satellite.* A closer satellite could be made to circle the Earth several times daily (as does Mar's Phobos), and could be used as a mobile "spy," to observe telescopically events in any country over which it might pass, and relay its observations to Earth by television. Such a satellite could also be used to launch guided missiles at an enemy; only a negligible amount of fuel would be necessary to free a missile from the infinitesimal gravitational attraction of the satellite and send it speeding Earthward under the Earth's own gravitational pull. Use of the Moon for such purposes has also been suggested, although its greater distance and greater surface gravity would make it more difficult. However, the Moon's greater distance would also make it less vulnerable to a guided-missile attack from Earth. Although this sounds like science-fiction, it is a possibility if another worldwide conflict should break out. (We must not forget that the atomic bomb was thought of as an *extremely remote* possibility at the beginning of World War II !) It is quite unfortunate that we are compelled these days to think of war rather than of peace. There was once a time when the *astronomer,* more so than any other scientist, was quite "free" from the wars of the world. It now appears that even he may be forced to take part in warfare. May God grant that space warfare and this misuse of man's astronomical knowledge will never become necessary !

CHAPTER VIII CONCLUSION 'IF WE WERE WILL'G'

These explorations of other worlds seem very unreal and far-away. The gap between us and the other heavenly bodies seems to be not one of space, but one of time—not of the time which would be taken to cross the gap, but the time *which must yet elapse* before the gap can be crossed. It is possible that this great feat may be accomplished in our time. It is predicted by 1955, atomic-energied machines will be running on the Earth. Space-voyages might be possible earlier than they will be *IF WE WERE WILLING ! !* Yes, *if we were willing* to spend the time and money on research. If the government of any country would be *willing* to set aside a large amount of money for *research* work on a *large scale*, our goal, the heavens, would be reached sooner. The government of the United States already has workers studying plans for putting atomic energy to work, but for *terrestial* use. It seems, therefore, that we can expect very little work done on a

space-ship until after 1955.

However, a small group of scientific workers *is* working on rocket motors and rocket parts, and it may be that before we expect it, radio-controlled rockets will be circling the Moon and returning to the Earth with photographs of the Moon's "other side". It may even be that radio-controlled rockets will precede expeditions to Mars and the other planets. Who can tell what may happen ?

We now seem to be more "willing" than we were in 1946. Experimental chemically-powered rockets have reached speeds of well over one mile per second. Atomic-powered engines are soon to be put into use. If our government becomes aware of the potential military value of the Moon, there will be little delay in the launching of the first Lunar expedition. From a Lunar base, the entire Earth could be seen rotating on its axis once every 25 hours, every country becoming visible for a time during each period. The nation controlling the Moon could launch guided missiles at its enemies, who could eliminate this menace only by a carefully-aimed attack on the Moon itself. Although this sounds like science-fiction, it is a possibility if another full-scale war should break out. Let us hope that the democratic nations of the world may be the first to take possession of the Moon.

SIDEREAL TIME

Samuel E. W. Haines

A sidereal day is the interval between two passages of a fixed star across the meridian of any particular place, and is 23h 56m 4.1 s. of standard time, and is the period of the Earth's rotation on its axis.

A Standard Day is the interval between two passages of the center of the Sun across the meridian of any particular place, and is 24 hours. But for the convenience of astronomers and navigators or shall we say, by general agreement, instead of using a particular star for the crossing of the meridian to indicate zero sidereal time, we use a fictitious point in the sky where the earth's orbit and the Earth's Equator cross each other on the 23 of March, called the Vernal Equinox and at this instant we have Sidereal Noon and also at this instant, or on this day our Standard Time and Sidereal Time read the same. Due to the Earth's orbit being an ellipse, its speed around the Sun is not uniform and this causes the solar day to be sometimes ahead of the Standard Time and at others behind Standard Time and these small differences are called the Equation of Time and are added to the solor "apparant" Time in one half a year and subtracted from "apparant" solar time the other half to make our Standard Time which we use every day.

In other words our Standard Time is based upon a fictitious sun crossing the meridian.

Also the fictitious point of the sky we call the Vernal Equinox used for Sidereal Time is affected not by the Equation of Time but by the retrograde motion of the Precession of the Equinoxes in Right Ascension which is a very small amount equal to .009s. per day shorter than the period of rotation.

But this precession of the equinoxes is not uniform either. It is affected by irregularities called Nutation due to solar and lunar perturbations. Sidereal time is therefore affected by Nutation in Right Ascension and amounts to 1.2s plus and minus.

Nutation is divided into two parts one part one of long period terms of 18 years and vary between 1.2s plus or minus and the short period terms or about 15 days and amount to about .02s plus or minus. When these variations are taken care of we have a Standard Sidereal Time.

The Sidereal Day is 3m 55.909s shorter than the Standard Day.

It will be seen from the above, the sidereal time varies but little from year to year, amounting to not more than two minutes more or less from the average.

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What is the Sidereal Time at Phoenix, Ariz. April 1 1953 at 9 p. m. Mountain Standard Time ?

1.	9 P. M.	21h	00m	00s
2.	Add Long. of M.S.T. Zone 105°/15	7	00	00
3.	Result — Greenwich Time	28	00	00
4.	Subtract Long. Phoenix 112°/15	7	28	00
5.	Result — Phoenix Time	20	32	00
*6.	N. A. p64 Aries G. H. A. 189° 4'/15	12	36	15
7.	Sid. gain in (3) 28h x 9.83 secs. ph.		4	36
8.	Phoenix Sid Time add (5) (6) (7)	9h	12m	51s

*Nautical Almanac (from Washington, D.C.) Aries Greenwich Hour Angle at 0h Greenwich Time, page 64 first column. Conversion of degrees to hours and minutes page 260. Price $2.25.

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*Sidereal Time at Greenwich can be obtained also from the Observer's Handbook published by the Royal Astronomical Society of Canada 3 Willcocks St. Toronto 40¢.

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Subscriptions received by Booksellers and Opticians everywhere
Canada $1.00; Foreign $1.00
MRS. LEON BARRITT, Editor
Contributing Editor
Irving L. Meyer
Please make checks payable to "The Monthly Evening Sky Map"
Copyright by Maria Barritt
Box 3, Pike County, Shohola, Pa.
Telephone Milford 2310

Vol. XLVII Shohola, Pa. April-May-June 1953 Whole No. 476

AMATEUR'S FORUM

By IRVING L. MEYER, M. S.

April 1953

THE SUN : travels from Pisces into Aries. It is moving in a northeastwardly path. Distance increases from 92.9 to 93.6 million miles.

THE MOON : is at perigee (closest to the earth) on the 12th at 224,000 miles, and is at apogee (farthest from the earth) on the 24th at 252,000 miles.

The Moon's Phases (E. S. T.) :

Last Quarter	April 6 at 11:58 PM.
New Moon	13 at 3:09 PM.
First Quarter	20 at 7:40 PM.
Full Moon	28 at 11:20 PM.

MERCURY : is in the Aquarius-Pisces area all month in the morning sky. It is at greatest elongation west of the Sun, 27° 36', on the 15th, so for a few days before and after this date it will be observable in the morning sky shortly before sunrise. On the 15th, magnitude is 0.6, and its 8" disc is 46% illuminated. Distance the 1st is 62 million miles, and the 30th is 100 million miles.

VENUS : is not easily observed this month, as it is in inferior conjunction with the Sun on the 13th. Venus on that date will pass about 7° north of the Sun, and a circle-equipped telescope, shielded from the direct rays of the Sun, will show up the planet. At that time, its atmosphere causes refraction which lights the planet as a ring, or nearly so, as seen from the earth. It is closest to the earth at this time, an d its distance is 26.4 million miles, with apparent diameter of 59". Travels from Aries into Pisces during the month.

MARS : moves from Aries into Taurus, in the evening sky. In conjunction with Jupiter on the 27th, its magnitude of close to 2.0 makes it much fainter than Jupiter. Not well placed for observation. Distance the 1st is 214 million miles, and the 30th is 226 million miles.

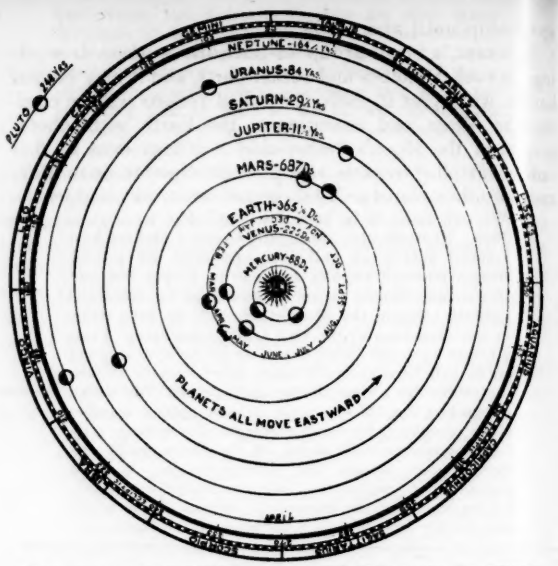
JUPITER : moves into Taurus in the evening sky, but is too close to the Sun for satisfactory observation. It is about one degree south of Mars on the 27th, at magnitude -1.6. Distance the 15th is 536 million miles.

SATURN : comes to opposition the 14th, in Virgo, and is well placed for observation all month. On the 14th, distance is a minimum of 809 million miles ; magnitude is 0.4 ; the apparent diameter of the ring system is 43", and of the planet itself, 19". The rings are noticeable in small telescopes ; moderate power (50x and up) will show them clearly, as well as Casini's division. The brightest satellite, Titan, can be seen in small telescopes, and several more can be seen with moderate sized instruments.

URANUS : in Gemini in the evening sky, sets before midnight. It will leave the night sky shortly. Magnitude is 6, and distance is 1755 million miles on the 15th.

NEPTUNE : also comes to opposition this month, on the 12th. On this date, minimum geocentric distance of 2722 million miles is reached ; apparent diameter is 2 1/2", and magnitude is 7.7. Though this planet cannot be seen with the unaided eye, it can be picked up in binoculars ; its disc can be made out readily under a power of 100x on a telescope. In Virgo the entire month.

IN SELECTING YOUR GIFTS, INCLUDE A SUBSCRIPTION TO THE "MONTHLY EVENING SKY MAP" FOR YOUR FRIENDS. IT WILL BRING THEM A EAR OF INTELLECTUAL PLEASURE, AND LAY THE FOUNDATON OF A LIFETIME OF INTELLIGENT OBSERVATION OF THE HEAVENS IN YOUNG PEOPLE.



Orbits and Heliocentric Movements of the Planets for April 1953

NOTE: The planets are shown in their respective orbits. Two positions, one for the first, and one for the last day of the month, are given for Mercury, Venus and Mars. The arrow indicates the last day of the month. Jupiter, Saturn, Uranus and Neptune are shown in the mean position for the current month.

PLANETARY CONFIGURATIONS

Eastern Standard Time

April, 1953

April	2— 5:	AM	Mercury in descending node.
April	4— 9:	AM	Quadrature, Uranus and Sun
April	11— 8:31	PM	Conjunction, Mercury and Moon; Mercury south 6° 2'
April	12—12:	PM	Mercury in aphelion
April	12— 1:	PM	Opposition, Neptune and Sun
April	13— 3:	AM	Inferior conjunction, Venus and Sun; Venus north 6° 55'
April	13—12:36	PM	Conjunction, Venus and Moon; Venus north 2° 14'
April	14—12:	AM	Opposition, Saturn and Sun
April	15— 5:	AM	Mercury greatest elongation west, 27° 36'
April	15—11:03	AM	Conjunction, Mars and Moon; Mars south 4° 48'
April	15— 8:37	PM	Conjunction, Jupiter and Moon; Jupiter south 5° 42'
April	19—12:24	PM	Conjunction, Uranus and Moon; Uranus 1° 39' south
April	27—11:	AM	Conjunction, Mars and Jupiter; Mars north 1° 9'
April	27— 4:	PM	Conjunction, Mercury and Venus; Mercury south 7° 14'
April	27— 8:40	PM	Conjunction, Neptune and Moon; Neptune north 7° 7'
April	27—11:00	PM	Conjunction, Saturn and Moon; Saturn north 8° 14'

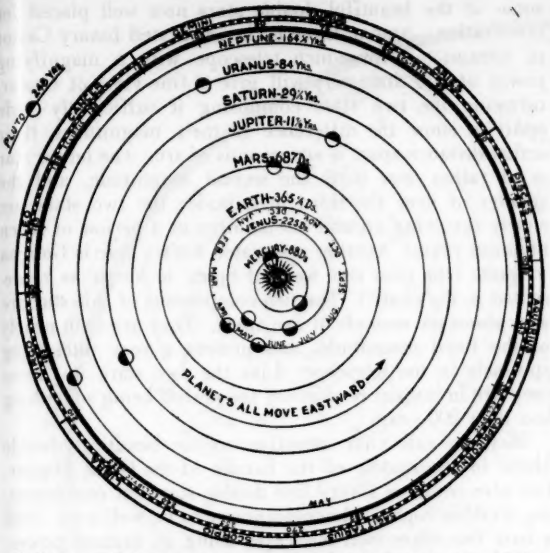
PLANETARY CONFIGURATIONS

Eastern Standard Time

May, 1953

PLANETARY CONFIGURATIONS
Eastern Standard Time
May, 1953

May	1— 9:	PM	Venus stationary in Right Ascension
May	2— 8:	PM	Mercury greatest heliocentric latitude south
May	10— 2:14	PM	Conjunction, Venus and Moon; Venus south 4° 1'
May	12— 3:31	AM	Conjunction, Mercury and Moon; Mercury south 6° 59'
May	13— 5:01	PM	Conjunction, Jupiter and Moon; Jupiter south 5° 18'
May	14— 6:13	AM	Conjunction, Mars and Moon; Mars south 3° 39'
May	16—10:	AM	Venus in descending node
May	16—11:07	PM	Conjunction, Uranus and Moon; Uranus south 1° 20'
May	19— 1:	AM	Venus at greatest brilliancy
May	21— 9:	PM	Mercury in ascending node
May	24— 8:	AM	Superior conjunction, Mercury and Sun; Mercury north 0° 26'
May	24— 4:	PM	Conjunction, Mercury and Jupiter; Mercury north 1° 9'
May	24—11:	PM	Conjunction, Jupiter and Sun
May	25— 3:14	AM	Conjunction, Neptune and Moon; Neptune north 7° 13'
May	25— 3:32	AM	Conjunction, Saturn and Moon; Saturn north 8° 16'
May	26—12:	PM	Mercury in perihelion
May	31— 6:	AM	Conjunction, Saturn and Neptune; Saturn north 1° 2'



Orbits and Heliocentric Movements of the Planets for May 1953

AMATEUR'S FORUM

May, 1953

THE SUN : is now deep in the northern heavens, moving from Aries into Taurus. Distance is still increasing, from 93.6 million miles the 1st to 94.2 million miles the 31st.

THE MOON : is at perigee the 10th at 227,000 miles, and is at apogee the 21st at 251,000 miles.

The Moon's phases (E. S. T.) :

Last Quarter	May 6 at	7:21 AM.
New Moon	13 at	12:06 AM.
First Quarter	20 at	1:20 PM.
Full Moon	28 at	12:03 PM.

MERCURY : moves from Pisces through Aries into Taurus. It is in the morning sky until conjunction with the Sun on the 24th, thereafter being in the evening sky. It is too close to the Sun all month to be observable. Maximum geocentric distance (the 23rd) is 123 million miles.

VENUS : is well placed for observation in the morning sky, and is at greatest brilliancy on the 19th (magnitude -4.2). It is in Pisces all month. Distance increases from 31 to 49 million miles. Apparent diameter diminishes from 51" to 32", and the area of the disc illuminated increases from 10% to 36%. This planet can be seen in full daylight with the naked eye.

MARS : in Taurus, is too close to the Sun for satisfactory observation. Distance the 1st is 227 million miles, against 237 million miles the 31st.

JUPITER : is in conjunction with the Sun in Taurus on the 24th, thus entering the morning sky. Too close to the Sun all month for observation. It is farthest from the earth the 26th at 562 million miles.

SATURN : is the most prominent planet in the evening sky. It is in Virgo all month, and on the last day is in conjunction with (1° north) Neptune. It is a very interesting telescopic object. Distance the 15th is 822 million miles.

URANUS : is in Gemini in the evening sky, but is no longer well placed for observation, since it is a faint planet and now sets only a few hours after the Sun. Distance the 15th is 1797 million miles.

NEPTUNE : is well situated for observation, since it is only shortly after opposition. It is close to Saturn, and just north of Spica in Virgo. Magnitude is 8—too faint for the naked eye. Distance the 15th is 2736 million miles.

APRIL EVENING SKIES

The general character of the evening skies shows a great change since winter. The vast arch of the Milky Way which spanned the zenith in January and February now lies, as if fallen about the Western horizon, extending a faintly luminous band, from a point due north, to a point a little west of south where it dips behind the horizon. The brightest portion is in the northwest, involving the constellations Auriga, Perseus, and Cassiopeia. And with the Milky Way has descended the great array of first magnitude stars that centers about Orion, including such brilliants as Rigel, Aldebaran, Sirius, Betelguex, Procyon and Capella. All, however are visible, but in another month most of them will be gone.

A great change has come over the central and eastern part of the sky, the constellations now in the ascendant there being of a totally different character from that of those which throng around Orion. It is a singular fact that a real difference exists in the general nature of the stars in the Orion neighborhood and that of those in other parts of the sky, so that astronomers group certain stars presenting peculiar spectroscopic insignia, under the name of "Orion stars." In a broad sense they appear to be younger than the other stars. Whether the prevalence of white stars around Orion produces an appreciable effect upon the eye or not, it is certain that the constellations now occupying the meridian and advancing up the eastern slope of the heavens make a less dazzling impression. The light of their stars seems more subdued and less penetrating. They are the advance guard of the Summer stars, and their softened rays accord with the character of the season. while the gem-like brilliance of the Winter stars repeats the sparkle of the snow landscapes spread beneath them. April is noted for one of the annual "showers" of shooting stars. (Meteors) These particular meteors are known as the Lyrids because they radiate from the little constellation Lyra, which is remarkable for the beauty of its chief star Vega, and which may be seen rising in the northeast. This "shower" occurs during about three evenings, from April 20 to 22.

THE STARS AND CONSTELLATIONS

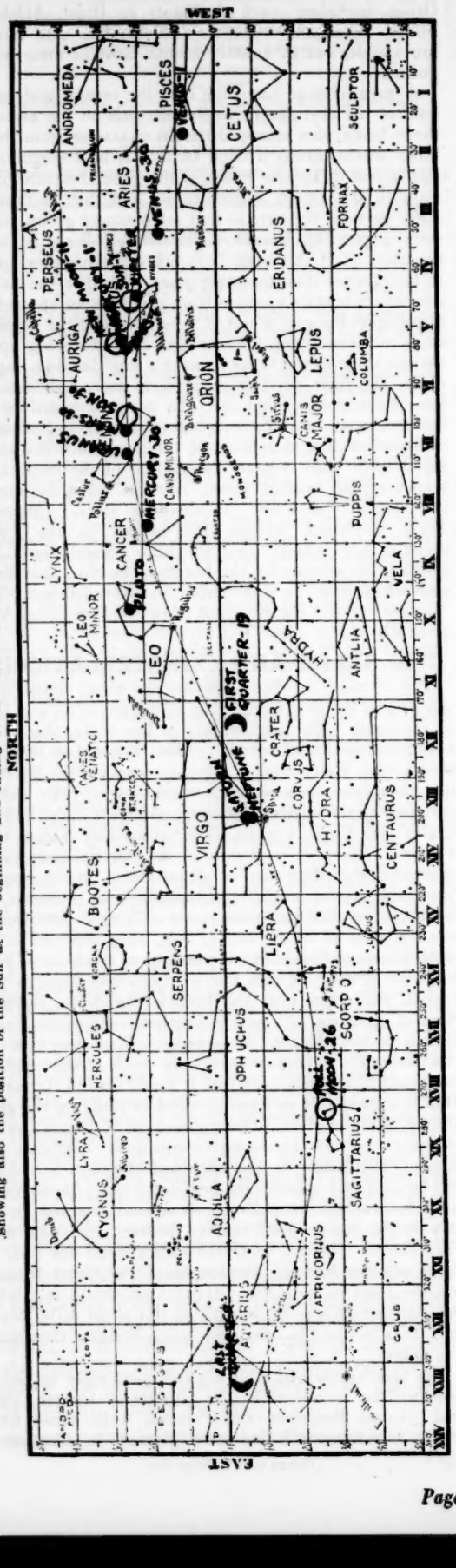
The "Sickle" of Leo occupies the most conspicuous position in the sky, being close to the meridian and high in the south. The brighest star in Leo is Regulus at the bottom of the handle of the sickle. Below Leo stretches Hydra (the Water Snake) Alphard marking the heart of this imaginary sea serpent, whose starry coils extend eastward to the horizon, running under the constellations Crater (the Cup), Corvus, (the Crow) and Virgo, (the Virgin). The pure whiteness of the star Spica in Virgo commands the admiration of all beholders. In this respect Spica will be seen to differ noticeably from Arcturus, in Bootes, which lies far to the north of Virgo. Arcturus is often spoken of as the star of Job, being referred to by name in one of the sublimest passages of the book of Job. Its color, in contrast with that of Spica and Vega, is yellowish, and when near the horizon decidedly reddish. West of Arcturus and nearly overhead shines the Great Dipper in Ursa Major. The reader will observe that the "handle" of the Dipper curves in such a way that if continued in an imaginary line it would lead to Arcturus. This is a good fact to keep in mind in studying the geography of the heavens. The circle of the Northern Crown (Corona) is now becoming conspicuous northeast of Bootes. Still lower in the northeast Hercules is rising, and beyond that sparkles the brilliant Vega. Above Vega is the head of the great Draco whose coils marked by no very bright stars, wind upward between the pole and Ursa Major. The star in Draco with a small one near it about midway between the handle of the Great Dipper and the bowl of the Little Dipper (see chart) is Alpha Draconis, which was the north pole star about 4,700 years ago. It is believed to have been much brighter then than it is today.

The observer armed with a good opera-glass or field-glass will be interested in the clusters in Cancer, (the Crab) Coma Berenices and Perseus, while those who possess telescopes will find great pleasure in examining

(Please turn to Page Six)

A MERCATOR PROJECTION OF THE STAR FIELD FOR 50 DEGREES NORTH AND 65 SOUTH OF THE EQUATOR

The Star Field makes an apparent complete revolution westward every 24 hours, hence the hourly division from I to XXIV, but this has no relation to the time that any portion of the map is in view
Practical as a Star, Constellation and Planet Finder for the current months—April-May-June, 1953—Anywhere in the World.
Showing also the position of the Sun at the beginning and ending of the month and the position of the Moon at its several phases



some of the beautiful double stars now well placed for observation. Among these is the celebrated binary Castor in Gemini. A three-inch telescope with a magnifying power of 100 diameters will give a fine view of Castor, throwing the two stars composing it sufficiently wide apart to show the difference in their magnitudes, their actual distance apart is six seconds of arc. The larger star is of rather less than the second magnitude, and the smaller of near the third magnitude; the two stars are slowly revolving around one another in a period of seven hundred years. Another celebrated binary star is Gamma Virginis (the first star west of Spica in Virgo as represented in the chart.) The two components of this star are also about six seconds of arc apart. They are both nearly of the third magnitude, and present a very interesting spectacle in the telescope. Like the two stars in Castor they are in mutual revolution, the period being something less than 200 years.

May we call your attention to the beautiful double Mizar in the middle of the handle of the Great Dipper. Leo also contains a very fine double star, but one requiring a rather higher telescopic power to be well seen. Still a first rate three-inch telescope, using its highest power, should show it. It is the star Gamma Leonis, the second one about Regulus in the Sickle. Like Mizar its components show contrasted colors, the larger one of the second magnitude being yellow and the smaller of the fourth magnitude, green; the distance apart is not much more than three and a half seconds of arc.

Observe the great triangle formed by the stars Regulus, Spica, and Arcturus. The distance from Regulus to Spica is about 50° and from Spica to Arcturus about 30°.

THE LYRIDS

In 1867 meteors took their proper place in astronomy. Before that year they had not been considered worthy of careful observation. A handful of pioneers in Europe and America did all the work which was of any value. Most astronomers had more "important" things to accomplish.

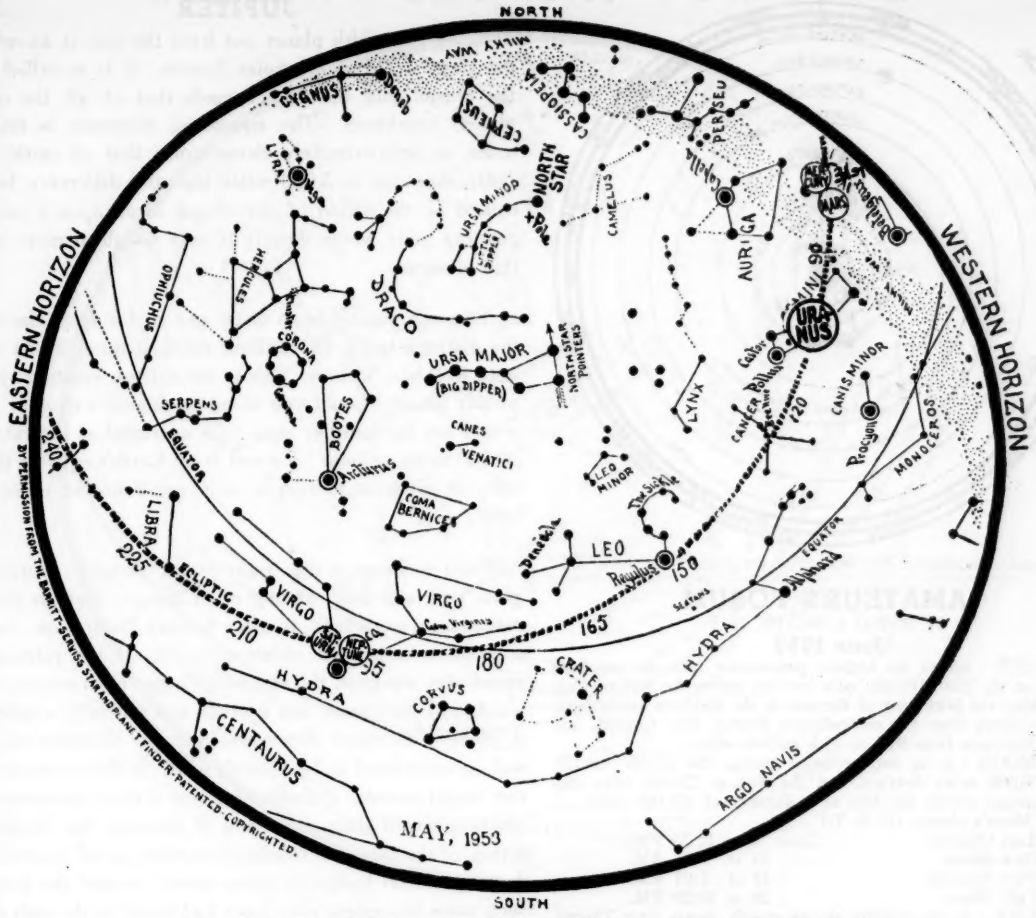
The November display in 1866 stirred the interest of both the public and the astronomers. That same year Schiaparelli announced that the Perseids followed an orbit similar to the orbit of Tuttle's Comet. He suggested that there was a physical connection between the two. After the Leonid shower several astronomers began calculating the orbit of the swarm which caused it. In January, 1867, three of them reached the same conclusions. Within five days of each other, Schiaparelli, C. F. Peters and von Oppolzer all announced that the Leonids ran in the track of Temple's Comet. In February Weiss and d'Arrest independently pointed out the relation between Biela's Comet and the Andromedes and at the same time Weiss remarked that in several past years meteors had been recorded on April 20, when the orbit of Comet 1861 was within 0.002 astronomical units of the earth. Johann Galle of Breslau (the same Galle who as an assistant at Berlin, discovered the planet Neptune) undertook the derivation of the orbit of meteors. He was finally able to show that their orbit was similar to that of the comet's.

ASTRONOMER HONORED

Subrahmanyan Chandrasekhar, world-famous University of Chicago astronomer, has been awarded the gold medal of the Royal Astronomical Society of London, the highest award in the field of astronomy.

The presentation of the medal to the Indian-born astrophysicist marks the third time the prize has been awarded a University of Chicago astronomer.

George Ellery Hale, who was the first director of the University's Yerkes Observatory at Williams Bay, Wisconsin, received the gold medal in 1904, and Otto Struve, third director of the observatory and now professor of astrophysics at the University of California, in 1944.



AT 9:15 P. M., MAY 1; 8:30 P. M., MAY 10; 7:45 P. M., MAY 21

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

Chandrasekhar received the Royal Astronomical Society medal, the Nobel prize in astronomy for the development of new mathematical tools for the study of astronomy. Like the late Sir Arthur S. Eddington, who received the medal in 1924, Chandrasekhar is a "pencil and paper" astronomer. Since Sir Arthur's death in 1944, Chandrasekhar has been designated by his colleagues as the outstanding present-day "arm chair" astronomer.

A member of the University of Chicago faculty since 1937, Chandrasekhar was recently named at the University to hold the Morton D. Hull distinguished service professorship.

Chandrasekhar was the first astronomer to study the internal constitution of stars in the light of modern atomic theories. He began his career as an astrophysicist in England with R. H. Fowler and E. A. Milne, and the current theory explaining super-dense stars, generally accepted by physicists and astrophysicists, was developed by him during his fellowship period at Trinity. He is now best known for his theoretical research in the fields of stellar spectra, motions, and atmospheres.

In 1946, Chandrasekhar presented the Gibbs lecture of the American Mathematical Society and in 1949, the Russell lecture of the American Astronomical Society. He was awarded the Adams prize in Cambridge, England, in 1947, and the Bruce Medal of the American Astronomical Society of the Pacific in 1952. He is a fellow of the Royal Society of London and a councilor of the American Astronomical Society.

During the war, Chandrasekhar was a consultant in the Ballistic Research Laboratories, Aberdeen, Maryland. He is author of *Introduction to the Study of Stellar Structure, Principles of Stellar Dynamics* and *Radiative Transfer*.

Chandrasekhar received his bachelor's degree from Madras (India) in 1930 and his doctor of philosophy degree from Cambridge in 1933. Cambridge also bestowed upon him an honorary doctor of science degree in 1942.

He resides at Williams Bay, Wisconsin, where the University of Chicago observatory, Yerkes, is located.

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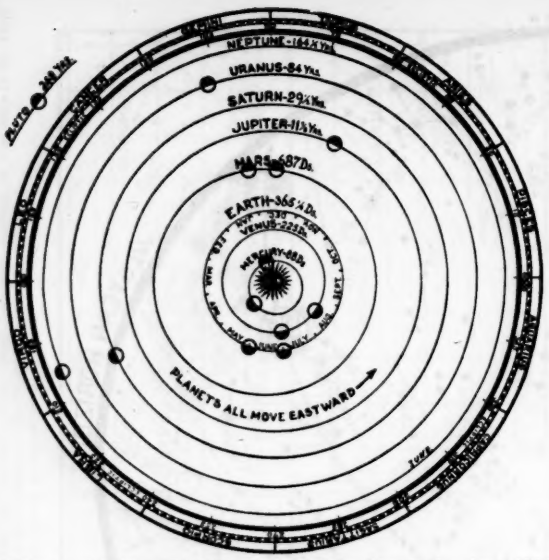
Maria Barritt, *Editor*



Orbits and Heliocentric Movements of the Planets for June, 1953

AMATEUR'S FORUM

By IRVING L. MEYER, M. S.

June 1953

THE SUN : makes its highest penetration into the northern heavens on the 21st. On this date the Sun enters the Sign of Cancer, marking the beginning of summer in the northern hemisphere. The Sun moves from the constellation Taurus, into Gemini, and distance increases from 94.1 to 94.4 million miles.

THE MOON : is at perigee twice during the month—on the 5th at 230,000 miles distance, and the 30th at 228,000 miles distance ; apogee occurs the 18th at a distance of 251,000 miles.

The Moon's phases (E. S. T.) :

Last Quarter	June 4 at 12:35 PM.
New Moon	11 at 9:55 AM.
First Quarter	19 at 7:01 AM.
Full Moon	26 at 10:29 PM.

MERCURY : in the evening sky all month, moves from Taurus through Gemini, into Cancer. For approximately the last week of the month it will be visible in the late twilight, low in the west. It reaches greatest elongation east of the Sun, 25° 31', on the 27th. On this date, the telescope, with moderate power, will reveal the 8" diameter, crescent-shaped disc of the planet. Magnitude will be about 0.7. Distance the 1st is 118 million miles, and the 30th is 75 million miles.

VENUS : is the queen of the morning sky. At its greatest elongation west of the Sun, 45° 46', on the 22nd, it is ideally situated for observation. It moves from Pisces through Aries to the Taurus border. On the 1st, the planet is 39% illuminated (hence crescent-shaped in the telescope), magnitude is -4.1, diameter is 31", and distance is 50 million miles ; on the 30th, 54% is illuminated, magnitude is -3.9, diameter is 22", and distance is 71 million miles.

MARS : moves from Taurus into Gemini. Technically in the evening sky, it is much too close to the Sun for observation. Distance the 1st is 237 million miles, and the 30th is 243 million miles.

JUPITER : in the morning sky in Taurus, is too close to the Sun all month for convenient observation. Distance the 15th is 558 million miles.

SATURN : is well placed for observation in Virgo, setting well after midnight. Telescopically, Saturn is probably the interesting object in the heavens, considering its unique ring system. These rings can be seen in the smallest telescope, while larger instruments (6" and upwards) will reveal Casini's Division with ease, as well as the cloud belts on the globe of the planet. On the 15th, distance is 857 million miles, magnitude is 0.8, the apparent diameter of the ring is 41", and of the disc of the planet itself, 18" (equatorial). Saturn is almost exactly one degree north of Neptune at the beginning of the month, and is only very little more distant the 30th.

URANUS : in Gemini all month, in the evening sky, is too close to the Sun for observation. Distance the 15th is 1826 million miles.

NEPTUNE : in Virgo, about a degree south of Saturn and four degrees north of Spica. It is well placed for observation, but is faint—magnitude 8. It cannot be seen with the unaided eye. Distance the 15th is 2771 million miles.

JUPITER

Jupiter, the fifth planet out from the sun, is known as the giant world of the Solar System. It is so called for the reason that its mass exceeds that of all the other planets combined. The equatorial diameter is 88,000 miles, or approximately eleven times that of earth; the polar diameter is 5,000 miles less, the difference being caused by the action of centrifugal force upon a swiftly rotating body whose density is only one-third more than that of water.

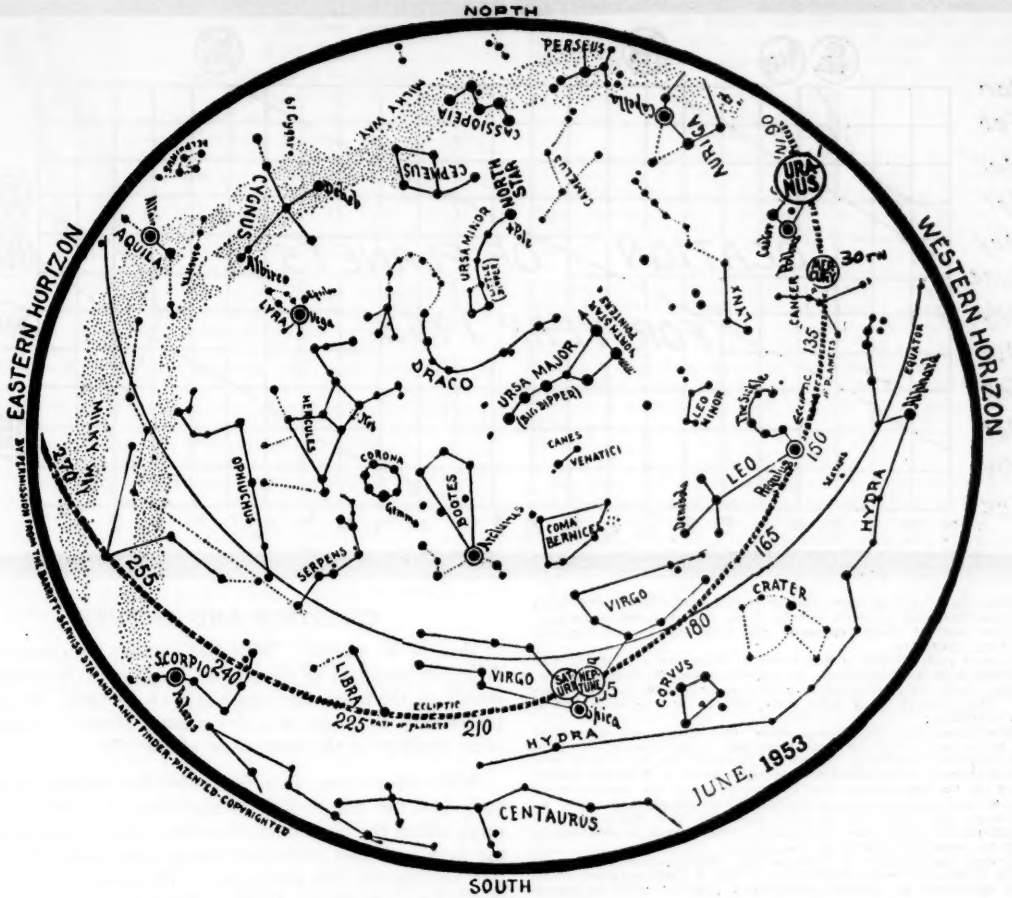
Although Jupiter is so large and so far from the sun, the distance being 483 million miles, it turns on its axis once in 9 hrs. 55 min. This is the swiftest rotating speed of any planet. Could you stand on Jupiter's equator you would see his familiar stars pass overhead at the rate of 30,000 miles an hour. Viewed from Earth's equator their rate of apparent motion is only one-thousand miles an hour.

When looking at this giant planet through a suitable glass you will note, among other things, that its shape resembles a grapefruit, to use a homely illustration. Such a globe is called an oblate-spheroid. If the rotational speed ever slackens, the equatorial bulge must move poleward, and the planet will become more nearly a sphere. A globe with equal diameters in every direction might well be considered to be nature's goal. In this connection, one might wonder if Earth ever was a more pronounced oblate-spheroid than now, and if through the braking action of the tides the resultant retarded speed caused its then equatorial budge to move slowly toward the poles. Such mass movement may have had much to do with the bending and twisting of the rock strata so prevalent in mountains and hills. This suggestion is made to provide a little more food for thought—not that it necessarily is founded on fact however, it is known that our planet's rotational speed is slowly, very slowly, diminishing because of the braking action of old ocean's tides.

All are aware that Earth experiences seasonal changes, especially within the frigid and the temperate zones. To a considerable extent the changes are due to the 23 1/2 degree tilt of the polar axis and also that the same direction of the axis is constantly maintained no matter where the planet may be along its orbit. We call that direction north.

In contrast, Jupiter's rotational axis is nearly vertical at all times. For that reason there never are any important changes in temperature at any given latitude. Thus, were there people on Jupiter they would need to climb the planet's mountains (if any) or travel north or south should they desire climatic changes. However, owing to the fact that when the solar energies have reached Jupiter they are reduced to practically one-twenty-seventh of their strength when they strike the Earth, it is apparent that climate, as such, does not show much variation anywhere on Jupiter. It is very cold on any location on the planet. A visitor from Earth would freeze to death at the equator

EVENING SKY MAP FOR JUNE



AT 9:00 P. M., JUNE 1; 8:00 P. M., JUNE 15; 7:00 P. M. JUNE 30

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

brown and orange predominates, olive green and bluish patches occasionally are seen.

Strange as it may seem, one hemisphere may be alive with color, while the other is dull; then again, the entire surface will be of a reddish cast.

The belts vary in width from 1,000 to 10,000 miles, that over the equator being the broadest. The changes in outline frequent and rapidly produced.

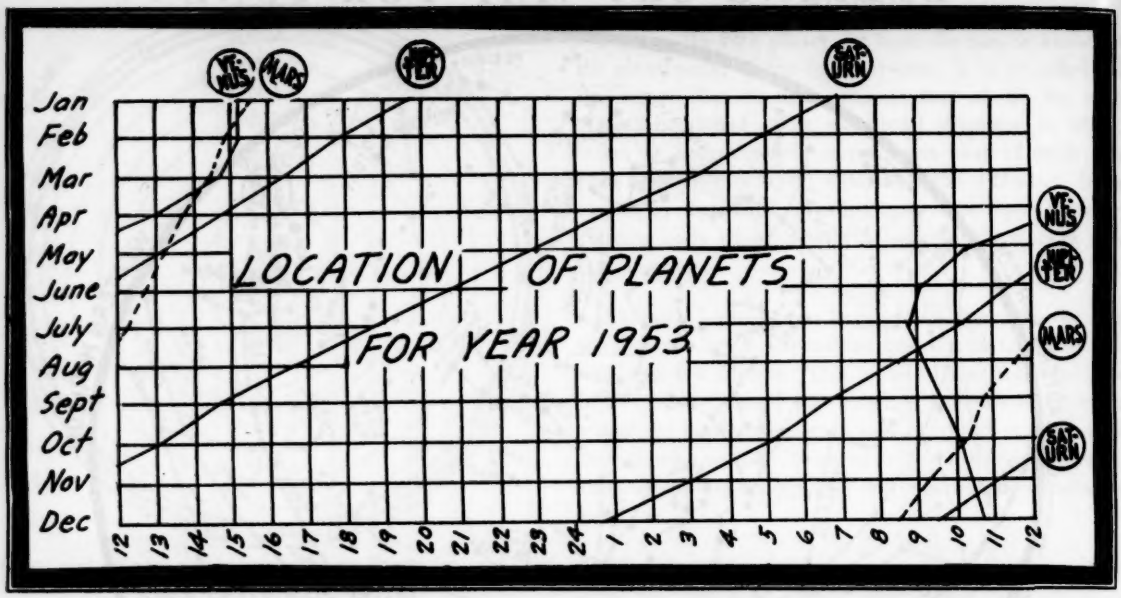
A peculiar and fairly stable feature of the planet's surface is a large red spot which was first observed in the year 1878. Its location is in the southern hemisphere, and its size is approximately 7,000 x 30,000 miles. At first this peculiar spot did not attract special attention, but a year later it had become the most conspicuous feature of the planet. For two or three years it so remained, then gradually began to fade as if the lighter vapors were trying to hide it from view. Following a pronounced reappearance it was seen that the swiftly moving adjacent belts turned aside from their former normal courses to avoid it, somewhat as a stream veers to one side to pass a boulder that was blocking its way. From this one would judge that the great red spot, as it is called, is composed of more solid matter than the belts. Possibly it is the very beginning of what may become a stabilized crust that will continue to spread until the entire surface is covered—but that is looking far, far ahead. Under great heat affined gases remain separate—an example being the sun—but with sufficient lowering of temperature they unite to form substance, as has happened with the Earth.
just as quickly as if he had landed at one of the poles.

Although the intensity of the sunlight that reaches Jupiter is greatly reduced, it still is sufficiently strong to cause the planet to be exceptionally bright, even though it has travelled 483 million miles first from the sun, then almost as far to contact our eyes. You recall that light moves through space at the constant speed of 186,000 miles a second.

When viewing this giant world through a powerful glass you will find a series of parallel bands, or belts, encircling it, in both hemispheres as well as over the equator.

What their cause and what they are there are, as yet, unsolved problems; nor is it known why they exhibit various colors alternately bright and dull. Although red,

(Continued next issue)



The above chart can be described as follows: The horizontal lines represent the first day of each month, from January 1st to December 1st., the vertical lines represent the local clock time for any standard time meridian.

At the lower part of the chart number 2 means 2 A.M. at any time meridian such as Greenwich, 75 degrees West, 90 degrees West, 105 degrees West, etc. The number 17 means 5 P.M. at any time meridian. The number 12 is noon time, and 24 or 0 is midnight at any time meridian.

The plotted lines for the planets show the local clock time that they will be on our standard time meridian, regardless of our geographical location. Example: Saturn on January 1st, at 7 A.M. will be on our standard time meridian. It will rise 5 or 6 hours earlier (depending on its declination and the latitude of the observer) or about 2 A.M. and will set 5 or 6 hours later or about noon time.

On February 1st it will be on your standard time meridian at 5 A.M. It should be noted that its apparent movement in relation to earth will be westward thru-out the year.

By observing the chart it is obvious that the apparent movement of Venus is Westward from January 1 to July 1 and eastward from July 1 to December 31. Venus crosses the path of Mars in Right Ascension on January 18th at 2 hours G. C. T. or January 17th at 9 P.M., Local clock time at the 75° meridian. They will be 12 apart in declination or 1/5 of a degree.

Venus and Mars cross each others paths again on March 17, at 23 hours G. C. T. or March 17 at 6 P.M. Local clock time at the 75 meridian. They will then be 7° apart in declination.

Mars and Jupiter cross each others paths on April 27 at 16 hours G. C. T. or April 27 at 11 P.M. Eastern Standard Time. At that time they will be 1° 09' apart in declination. However they will be far below the horizon at this time, and should be observed soon after sundown in the western sky. To the extreme left or right of chart where the transit of planets occur about 12 or noon; they are then too close to the Sun to be observed.

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PLANETARY CONFIGURATIONS

Eastern Standard Time

June, 1953

June 2— 5:	AM	Conjunction, Mercury and Mars; Mercury north 0° 57'
June 5— 6:	PM	Mercury greatest heliocentric latitude north
June 8— 3:22	AM	Conjunction, Venus and Moon; Venus south 8° 4'
June 10—12:33	PM	Conjunction, Jupiter and Moon; Jupiter south 4° 56'
June 12— 1:00	AM	Conjunction, Mars and Moon; Mars south 2° 11'
June 13— 2:05	AM	Conjunction, Mercury and Moon; Mercury north 0° 8'
June 13—10:41	AM	Conjunction, Uranus and Moon; Uranus south 1° 5'
June 16— 2:	AM	Conjunction, Mercury and Uranus; Mercury north 1° 27'
June 19—11:	PM	Venus in aphelion
June 21—10:34	AM	Conjunction, Saturn and Moon; Saturn north 8° 19'
June 21—11:00	AM	Conjunction, Neptune and Moon; Neptune north 7° 22'
June 21—12:	PM	Sun enters Cancer; Solstice
June 22— 5:	AM	Venus greatest elongation west, 45° 46'
June 24— 2:	PM	Saturn stationary in Right Ascension
June 27—12:	PM	Mercury greatest elongation east, 25° 31'
June 29— 5:	AM	Mercury in descending node

QUESTION AND ANSWER

Mrs. B. W. writes: "Will you explain the cause of the different positions of the moon's crescent ? Sometimes it stands on the point, and again lays on its back. It is often referred to as a wet or a dry moon. Does it occupy the same position at the same time of the year ?"

ANS.—Since the moon is visible by reflected sunlight only and the bright side of the moon is only that area upon which the sun shines, the terminator or line between the dark and light portions is always perpendicular to the line joining the sun and moon. Therefore, the horns of the moon will always be on a line perpendicular to the line joining sun and moon. This will determine whether the moon stands up on its horn, or lies down with its horn up. The one thing which we cannot see happen is a setting moon with its horns downward.

It cannot be said that the moon occupies the same position at the same time of year because the yearly period of the earth around the sun is not an exact multiple of the monthly period of the moon about the earth.

The connection of the moon with the weather is not scientific.

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The Monthly Evening Sky Map

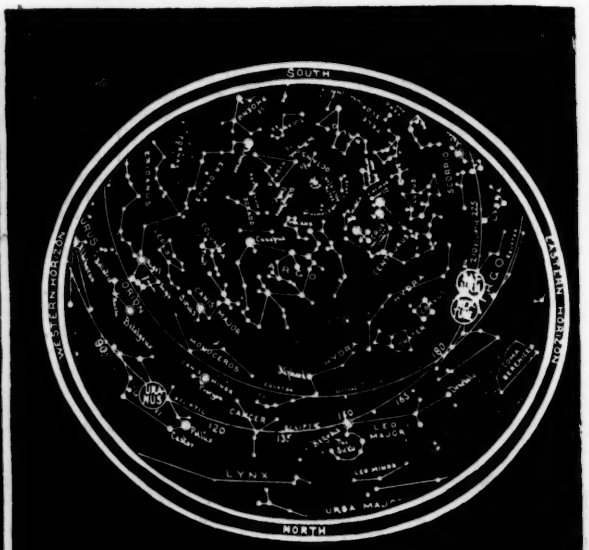
MORNING SKIES FOR APRIL–MAY–JUNE

AT 5:00 A. M., APRIL 1; 4:00 A. M., APRIL 15; 3:00 A. M., APRIL 30

AT 4:30 A. M., MAY 1; 3:30 A. M., MAY 15; 2:30 A. M., MAY 31

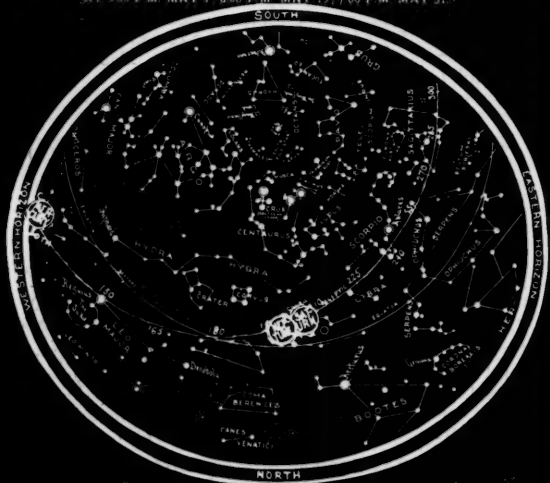
AT 4:00 A. M., JUNE 1; 3:00 A. M., JUNE 15; 2:00 A. M., JUNE 30

EVENING SKY SOUTHERN HEMISPHERE



AT 8:45 P.M., APR. 1; 7:45 P.M., APR. 15; 6:45 P.M., APR. 30.

AT 9:00 P.M., MAY 1; 8:00 P.M., MAY 15; 7:00 P.M., MAY 31.



AT 8:00 P.M., JUNE 1; 7:30 P.M., JUNE 15; 6:30 P.M., JUNE 30.